ANALYSIS

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WHAT IS A LANGUAGE ?

By K. Reach

IT is the task of empirical science to formulate in a suitable way, and to link by laws, all that perception presents to us of the external and the internal world. To put it briefly (but not quite correctly), the subject matter of empirical science is the *world*.

What is the subject matter of philosophy ? One hears frequently that philosophy deals with the world, too, but is concerned merely with its most general features. Hereby a highly inexpedient division of competence between scientists and philosophers is created ; for which features of the world are so general that empirical science is unable or not allowed to deal with them ?

It is impossible to draw a natural boundary, and no physicist will put up with such a limitation of the field of his activity. Therefore new physical discoveries frequently cause conflicts between physicists and philosophers. (Theory of relativity, quantum theory.) If there has never been a clash between psychologists and philosophers, the reason for this is partly that the former suffer the latters' tutelage, and partly that so far there has been no discovery incompatible with philosophical views on psychology. (There are, nevertheless, philosophers who oppose the psychoanalysts' theory of subconscious ideas.)

The claim of the philosophers to speak of the world has been challenged with much success in the last two decades by the

representatives of the former so-called Vienna Circle[1]—Schlick, Neurath, Frank, Carnap, and others—who have emphasized that all that can meaningfully be said of the world is said by empirical science.

Then no task is left for philosophers? Are they bound to retire into private life?

No, there is one subject left of which empirical science does not speak, that is empirical science itself! Thus, the task of philosophy is the *analysis of science*; this is a second principle of the Vienna Circle. In other words, the subject matter of philosophy is the *language of science*. Philosophy is *metascience*.

This recognition of its real destination has made of philosophy, which has been for two millenia an arena of competing schools, a science. All the progress it has made in the last two decades, it owes to the discovery of its proper subject matter, the language of science.

All we have said so far serves merely to exhibit the crucial rôle of the concept of language in modern scientific philosophy.

The aim of this paper is to inquire into some possible definitions of this important concept and others akin to it. It is obvious that only metascience is competent to give such definitions.

As Morris[2] emphasizes, there are three branches of metascience: *syntactics*, which is concerned solely with the signs of a language, and which is the successor of traditional grammar and logic; *semantics*, which deals with the interrelations between signs and the entities designated by them; and *pragmatics*, which considers signs in connection with the persons engendering and receiving them.

We shall see that a satisfactory definition of language requires the use of each of these sub-languages of metascience.

First let us see what syntactics contributes to the definition of language.

From the syntactic point of view a language is a system of signs satisfying certain conditions. These conditions have been

[1] In the last few years the Vienna Circle has been absorbed by the more comprehensive unit of the professors of Logical Empiricism, gathered round the collaborators of the *International Encyclopedia of Unified Science*.

[2] Cf. Charles W. Morris, 'Foundation of the Theory of Signs,' *International Encyclopedia of Unified Science*, Vol. I, Number 2, The University of Chicago Press.

exhibited in detail by Carnap,[3] and we shall present here merely the most important features a system of signs L must possess to be a language.

(1) L must be definite, i.e., it must be possible to decide about everything whether or not it is a *sign* of L.

(2) Sequences of signs are called *expressions*. It must be possible to decide about every expression of L whether it is a *sentence* or a *non-sentence* of L (Formation rules). For reasons of convenience it is usual in logical syntax to consider as sentences only affirmations. Questions, commands, etc., are excluded. However, it is not the fact that an expression is an affirmation that determines whether it is a sentence, but its syntactic structure. (In traditional grammar also, sentences are defined formally ; e.g., an expression consisting, in turn, of an article, a substantive, a verb in the third person of its active form, an indefinite article, and a substantive, is a grammatical sentence, for example, " The lion is a number.")

(3) It must be possible to decide about two sentential classes C and C′ whether or not C′ is a *direct consequence* of C (Transformation rules). Here the difference between traditional logic and logical syntax is most striking ; while in the former the correctness of an inference from C to C′ cannot be tested without referring to the meaning of the sentences of C and C′, in the latter the legitimacy of a deduction depends merely on the syntactic structure of the sentences occurring in it.

For the sake of convenience we shall consider the empty expression (which contains no signs at all) as a sentence, and we designate the class consisting only of this sentence by " E." Then we can define the *axioms* of L as direct consequences of E.

If there is a sequence of sentential classes C_0, C_1, . . ., C_n such that C_k is a direct consequence of C_{k-1}, then C_n is a *consequence* of C_0. Consequences of E are called *valid* in L. If S is a sentence of a valid class of L, S is *valid* in L. If S is valid in L, the negation of S is *contravalid* in L. If a sentence of L is neither valid nor contravalid in L, it is *indeterminate* in L. If C consists of the sentence S, and C′ of the sentence S′, and C′ is a consequence of C, then S′ is a *consequence* of S. If S′ is a consequence of S and vice versa, S is *equipollent* with S′.

[3] Cf. Rudolf Carnap, *Logical Syntax of Language*, Kegan Paul, London 1936.

It is of the greatest importance that all the concepts of logical syntax so far quoted can be defined with the aid of the concept of direct consequence.[4] For example, we can say that the expression F is a sentence of L, if it is equipollent with itself, and, since sentences are sequences of signs, signs of L can be defined as elements of the fields of sentences of L.

Languages in the sense of logical syntax may be called *formal languages* or *linguae*.

There are still further important concepts capable of definition in logical syntax. We quote some of them which we shall employ later on.

We call a relation R a *translation rule* from the language L to the language L′, if it assigns to every sentence in L an expression in L′. If R holds between the expressions F and G, symbolically, if " R(F, G) " holds, we say that the sentence F in L is R-*expressible* in L′ by G. If G is a sentence in L′, we say that G is an R-*translation* of F into L′. Example : L is a sector of the German everyday language, L′ a correct English language of science. R is determined by a dictionary. F is the sentence, " Der Hund ist ein Tier," G, " The dog is an animal." F′ is the sentence, " Der Hund ist eine Farbe," G′ is the expression, " The dog is a colour." Thus F and F′ are R-expressible in L′ by G and G′ respectively, but only G is an R-translation of F.

If we tried to introduce the term " *meaningless*," which has played a great rôle in the epistemological papers of the last decade, into logical syntax, we should get many interpretations. We present two of them :

(1) " Meaningless in L " means " non-sentence in L." (E.g., the sentence G′ previously mentioned is meaningless in L.′)

(2) " F is meaningless in L " means that F is a sentence of L to which the translation rule R assigns a non-sentence of L.′ (E.g., F′ is meaningless in L with respect to R and L′.)

These two concepts of " syntactic " meaninglessness have rarely been clearly distinguished.

If P is a physical language and M a metaphysical one, there will be sentences in M meaningless with respect to P, and sentences in P meaningless with respect to M. From the stand-

[4] Carnap, *loc. cit.*

point of logical syntax neither of these languages is in a superior position. Syntax is neutral, and admits every language which, according to its syntactic rules, is a lingua (Carnap's tolerance principle[5]). Hence in logical syntax the term " meaningless " entails no judgement of value.

If two linguae L and L′ differ only in their signs, and if every sign of L′ occurs in L, or is definable in terms of the signs of L, we call L′ a *verbal sub-language* of L. E.g., according to Russell[6] arithmetic is a verbal sub-language of logic. If two linguae L and L′ differ merely in their signs, and if there are signs in L′ which neither occur in L nor are definable in terms of the signs of L, we say that L′ is a *verbal continuation* of L. For instance, the geography of France is a verbal continuation of the geography of England. If the difference lies solely in the formation rules, we obtain the concepts of *thetical sub-language* and *thetical continuation*. If the difference lies solely in the transformation rules, we obtain the concepts of *deductorical sub-language* and *deductorical continuation*. In an analogous way may be introduced the concepts of *mixed thetical-deductorical sub-languages* and *continuations*. For example, according to the view of positivists, physics is a thetical continuation of the phenomenalist language, and biology a mixed thetical-deductorical continuation of physics.

All these terms we have just introduced may be regarded as preliminary and rather rough tools for future investigations into languages and their interconnections.

The concept of lingua goes far beyond the familiar notion of language. Even chess falls under it. We are, indeed, able to define a language Ch in this way : (1) every chessman is a sign of Ch. (2) every position on the chessboard is an expression of Ch. (3) every position in conformity with the rules of chess is a sentence of Ch, (4) if by a correct move a position S changes to a position S′, then S′ is a direct consequence of S in Ch, (5) if we consider the setting up of the chessmen upon the board as a correct move, we are allowed to regard the starting position as the sole axiom of Ch.

In spite of the great advantage of a purely syntactic concept of language, for certain purposes it is advisable to consider another

[5] Carnap, *loc. cit.*

[6] Cf. Whitehead and Russell, *Principia mathematica.*

concept of language which agrees better with the ideas the term " language " evokes in our minds.

In what does a language in the everyday sense differ from a lingua ? The answer nearest at hand is that a language in the everyday sense has a *meaning*. When has a language a meaning ? At first we must require that its signs and sentences mean something, that is to say that they designate something real. It is obvious that semantics is the language in which such ideas can be formulated.

As regards the individual and predicate constants it is easy to define the meaning. We lay down the following conditional definitions :

(I) x is an individual constant of L $\supset$ (x has a meaning $\equiv$ There is a y such that x is a designation of y).[7]

(II) x is a predicate constant of L of the type $t \supset$ (x has a meaning $\equiv$ There is an F such that x is a designation of F).

Such a definition must be laid down for every type of predicate of L. It is obvious that a meaning in this simple sense cannot be ascribed to other signs of L, such as variables, connective signs, quantifiers, etc. They do not designate anything, but they influence the meaning of sentences they occur in. We shall therefore call individual and predicate constants *autosemantic* signs, and the others *synsemantic* signs.[8]

Turning now to the meaning of sentences, we ask first of all whether the meaning of a sentence is fixed by the meaning of the signs constituting it. Since synsemantic signs also occur in a sentence, the question is to be answered in the negative. But what about sentences composed only of autosemantic signs ? It is easy to construct languages containing such sentences ; we need only to apply Russell's practice of writing " P*a*," instead of the form " P(y) " preferred nowadays. We are, however, able to show that the meaning of " P*a* " is not by any means fixed by the meaning of " P " and " *a*," for we can translate " P*a* " by " *a* is a P " as well as by " *a* is not a P." And, if " *k* " and " M " are certain especially significant constants, we can even stipulate the translation " *a* is an M, and *k* is a P."

All this shows that it is necessary to give an independent

[7] But y need not be an existing individual. This will be explained later on.

[8] These terms are due to the philosopher Anton Marty ; cf. *Untersuchungen zur Grundlegung der allgemeinen Grammatik und Sprachphilosophie*, Niemeyer, Halle 1908.

definition of the meaning of sentences. But what is the meaning of " A sentence is meaningful " ? Should we perhaps say that a sentence S has a meaning if there is a fact[9] ϕ such that S designates ϕ ? This sounds plausible. But what is the syntactic type of " ϕ " ? As ϕ is a fact we may well consider " ϕ " as a sentential variable of the language of this paper, and in this case we should, of course, write " p " instead of ϕ. But in " S designates p " the sign " p " can be replaced by every sentence equipollent with " p." This means that if S designates " A dog is barking " it necessarily designates " My telephone number is 76372 " too. Such a consequence is incompatible with the intuitive meaning of the relation of designation. We are thus bound to formulate the plausible statement that sentences designate facts in another way. It is obvious that a fact can be recorded by different sentences of the language we employ, and that all sentences recording one and the same fact are logically equipollent (l-equipollent). This means that there is a one-one relation between facts and abstraction classes[10] of l-equipollence. Thence we could define facts outright as abstraction classes of l-equipollence, and, consequently, we could say that a sentence has a meaning, if it designates an abstraction class of l-equipollence between sentences of this language.

This way of introducing the concept of fact has two disadvantages. (1) It violates the ideas we have about facts and events. I can hardly believe that the fact that I am smoking my pipe is a property of a sentence. (2) The expression " Abstraction class of l-equipollence between sentences of this language " is not an expression of the language of this paper, but belongs to its syntax ; by using such expressions we should complicate our language, moreover the definitions of the meanings of sentences and signs would belong to different languages.

We shall therefore adopt another way. We replace the term " designate " by the term " denote," which is to have the same intuitive meaning as the former, but, unlike all the other predicates of this language, is not submitted to the axiom of identity, " $p \equiv q) \supset (H(F, p) \supset H(F, q))$," but, instead, to the rule—

If " p " is l-equipollent with " q," then " F denotes q " is a consequence of " F denotes p."

[9] Need not be a true fact.

[10] Cf. Rudolf Carnap, *Abriss der Logistik* 20b, Springer, Wien, 1929.

This rule is throughout compatible with the meaning of designation or denotation, for if "A" is l-equipollent with "B" both record the same fact. If we accept this amendment to the syntax of this language, we are permitted to lay down the following conditional definition :

(III) S is a sentence of L $\supset$ (S has a meaning $\equiv$ There is a p such that S denotes p).[11]

It is easy and natural to lay down that a sign has a meaning if it occurs in a meaningful sentence. This can replace the definitions (I) and (II).

If we wish we may also in (II) replace " designate " by " denote," but I do not think that this is necessary.

There is no logical relationship between the meaning of a sentence and the meaning of its signs. If we wish to derive the latter from the former, a descriptive rule must be established. The character of it may be illustrated by the following instance. If, for all i, the sequence of signs x_i, y denotes the fact that a_i is a P, then y shall designate the property P.

If L is to have a meaning, it is reasonable to lay down : if F is a non-sentence of L, F has no meaning.

We propose the ensuing definitions :

Meaningful signs of L are *words* of L ;

Meaningful sentences of L are *statements* of L ;

If all sentences of L are statements, the non-sentences of L are *nonsensical*.

To understand the import of definition (III) let us consider an instance. We ask whether the sentence of the French language of metaphysics " Le principe de la substance est la volonté absolue " is meaningful. If we designate this sentence by " PSV," we have the task to determine whether there is a (fact) p such that PSV denotes p. We said nothing about the method to apply in solving such a problem, and we may presume that a positivist and a metaphysician will answer this question differently.

Let us see whether another definition of " meaningful sentence " avoids this disadvantage.

It is well established that all predicates of a language are linked, by definition chains and reduction chains,[12] with a finite

[11] " p " need not be true ; cf. footnote 9,

[12] Cf. Rudolf Carnap, 'Testability and Meaning,' *Philosophy of Science*, vol. 3.

number of (constant) *primitive predicates.* Atomic sentences containing only individual constants and primitive predicates (and brackets and commas, of course) may be termed *primitive sentences.* All the other sentences of L are in consequential context with the primitive sentences, and their meanings are thus determinate, if the meanings of the primitive sentences are given. Similarly, the meanings of all predicates of L are determinate, if the meanings of the primitive predicates of L are given.

Now we can give the definitions :

(II′) A primitive predicate is meaningful, if it designates a property or a relationship *observable* at least in principle ;

(III′) A primitive sentence is meaningful, if it denotes a fact *observable* at least in principle.

These definitions, however, are not purely semantical, because they use the anthropological term " observable." They are hybrids compounded of signs of science and metascience.

Of course, diversities of opinion as to whether an entity is observable or not can also arise here, but not to so large an extent as in the previous case.

It would be a great mistake to believe that any lingua whose signs are words and whose sentences are statements is necessarily meaningful. No, if a lingua is to have a meaning, it is necessary that the *predicates of its syntax admit of a certain interpretation.* We say : The syntax of L is meaningful, if the ensuing conditions are satisfied :

(A) S is a negation of S′ $\supset$ (S′ is true $\equiv$ S is false)

(B) S is a consequence of S′ $\supset$ (S′ is true $\supset$ S is true)

(C) The empty sentence is true

(D) The individual constants designate existing things.

Of these conditions (B) is the most important ; it postulates that L does not contain a " false " deduction rule, or, putting it otherwise, that the deduction rules are *truth-transferring.*

We infer : All valid statements are true, all contravalid statements are false.

The axioms of a meaningful language may be called *laws.*

The condition (D) is necessary because, if " *a* " is an individual constant, the statement " There is an *x* equal to *a* " is analytic ; if *a* did not exist we would have a language with an analytic false statement.

Now we must find a method of determining whether, for a certain language, the postulates (A)-(D) are fulfilled, or in other words, we must say what we mean by " true " and " false."

It is often said that a statement is true, if it is adequate to reality (Theory of adequacy). This is a highly defective and misleading way of expressing a correct idea. The idea is that a statement is true, if the event it denotes takes place. Thence we can say :

$$(E)\begin{cases} \text{S denotes } p \supset (\text{S is true} \equiv p) \\ \text{S denotes } p \supset (\text{S is false} \equiv {\sim}p) \end{cases}$$

We draw once more the reader's attention to the fact that " p " is not a sentential variable of the language L considered, but of the language of this paper. In this regard our definition of the truth is of the same type as Tarski's.[13]

In his recent paper " The name relation and the logical antinomies "[14] the present writer has given quite a different definition of truth,—viz. :

$$\mathrm{Nm}[\mathrm{S}](p) \supset (\mathrm{True}\ (\mathrm{S}) \equiv p),$$

where " Nm " is a name relation and " p " a variable of the language considered.

From (A) and (E) we conclude :

(S′ is a negation of S, and S denotes p, and S′ denotes q) $\supset$ ($p \equiv {\sim}q$)

From (B) and (E) we conclude :

(S′ is a consequence of S, and S denotes p, and S′ denotes q) $\supset$ ($p \supset q$)

From (B), (C), and (E) we conclude :

(S is a consequence of E, and S denotes p) $\supset p$

These sentences can be used as well as (A)-(C) as a criterion for the meaningfulness of the syntax of L.

From (C), (B), (A), and (E) we conclude :

Every meaningful language is *consistent*.

Proof : If L is inconsistent there is a sentence S such that S and the negation of S, S′, are valid. If S denotes p, and S′ q, we obtain $p \equiv {\sim}q$ and p and q. This is impossible, hence L cannot be inconsistent.

[13] Cf. Alfred Tarski, 'Der Wahrheitsbegriff in den formalisierten Sprachen,' *Studia Philosophica*, Vol. I (1935).

[14] *The Journal of Symbolic Logic*, Vol. 3, 1938.

The syntax of a meaningful language may be called a *grammar* (or *logical grammar*).

Now we shall put together in the form of a table the most important predicates of the syntax and the corresponding predicates of the grammar :

lingua	*meaningful language*
sign	word
sentence	statement
non-sentence	nonsensical expression
consequence	true → true
axiom	law

Let us now consider another way leading to meaningful languages.

Suppose a new kind of living beings discovered somewhere produces sounds similar to the singing of birds. What are we to do to decide whether these sounds form a meaningful language ? There is only one way. If we are able to ascertain that a certain sound sequence F occurs only if a certain physical event p takes place, we are entitled to presume that F records p, and, if we make many of such observations, to presume that these creatures speak a language.

This is the same method by which a child learns to understand the human language. This shows very impressively its composition. First of all it must contain a physical kernel, for otherwise we could not recognize that it is a meaningful language. This kernel is embedded in a sub-language which can be interpreted as a crypto-physicalist language. All other parts of it are continuations of non-physicalist character.

A last possibility, and the most beautiful of all, to define a meaningful language could perhaps be this :

The " world " has a certain " structure." A meaningful language " speaks about the world," hence its structure must be " similar to the world's structure." All this is nonsense, it only serves to suggest a possibly right idea viz. that meaning is a *structural* property of a language. Thus we should obtain a purely syntactic definition of meaningful language.

The translation rules defined previously are to be called *formal translation rules*. We will now explain what a meaningful translation rule is.

We call a translation rule R from L to L′ a *meaningful translation rule* (MTR) if it follows from R(S, S′) that there is a p such that both S and S′ denote p.

Generally it will be impossible to link two meaningful languages L and L′ by a MTR. For example, if L is the language of zoology and L′ the language of botany.

If there is a MTR from L to L′, and a MTR from L′ to L, we say that L and L′ are *equivalent* languages. Equivalent are, e.g., the French and the English language of chemistry.

Let us suppose we have accepted one of the definitions of "meaningful language" we exhibited above. Now we proceed to the definition of the epistemologically important notion of universal language.

A meaningful language U is a *universal language*, or a *Uni*, (1) if, by a MTR, every meaningful language L, except the syntax of U, can be translated into U, (2) if U contains that part of its syntax which is expressible in U[15], and (3) if the MTR is a correlator between the syntax of L and a part of the syntax of U.

If U_1 is a Uni and V_1 the syntax language of U_1, and, therefore, a meaningful language, and, besides, a continuation of U_1, then there is a Uni U_2, containing U_1 and V_1, but, of course, not the whole syntax language V_2 of U_2. Thus we obtain an infinite sequence of Unis U_1, U_2, . . . What we call the language of *unified science* is, strictly speaking, not a language, but a *sequence of Unis*.

We are now able to lay down the exact definitions for some terms important for the philosophy of science.

A sentence S of L is *absolutely meaningful* $\equiv$ There is a Uni U and a MTR R from L to U, and a statement S′ of U such that R translates S into S′.

A sentence S of L is *absolutely ambiguous* $\equiv$ There is a Uni U and a MTR R from L to U and two statements S′ and S″ of U such that R translates S into S′ and S″, and S′ is not l-equipollent with S″ in U.

[15] A consistent language cannot contain the whole of its syntax.

A sentence S of L is *absolutely absurd* $\equiv$ There is a Uni U and a MTR R from L to U and two statements S′ and S″ of U such that R translates S into S′ and S″, and S′ is l-equipollent to a negation of S″ in U.

A sentence S of L is *absolutely meaningless*, or *isolated* $\equiv$ It is not absolutely meaningful.

A deduction rule D of L is *absolutely meaningful* $\equiv$ There is a Uni U and a MTR R from L to U such that, if, by D, S_1 is a consequence of S_2, and S_1' and S_2' are R-translations of S_1 and S_2 respectively, S_1' is a consequence of S_2' in U.

The definition of the absolutely meaningful negation rule is quite analogous.

If all sentences of L are absolutely meaningful, and no sentence of L absolutely ambiguous, and all the deduction rules and negation rules of L absolutely meaningful, we name L an *absolutely meaningful language.*

These definitions can be employed to decide whether a sentence, language, etc. is meaningful, *if a sequence of Unis is given.*

A sentence S of L is *absolutely valid* $\equiv$ There is a Uni U and a MTR R from L to U such that every R-translation of S is valid in U.

The definitions of "*absolutely contravalid*" and "*absolutely indeterminate*" are quite analogous.

If every valid sentence of L is absolutely valid, every contravalid sentence of L absolutely contravalid, and if L is an absolutely meaningful language, we term L an *absolutely true language.*

The everyday language E is a language containing a class Sc of absolutely true sub-languages consisting of all ordinary scientific languages together with their everyday sectors. The remaining part of E is a mixture of verbal, thetical, and even deductorical continuations of the languages of Sc. It contains sentences of the "Geisteswissenschaften," of poetry and politics.

We get a very interesting notion of language by the ensuing considerations.

Suppose a hare runs across a field covered with snow in such a way that his footprints form the sentence "It is five o'clock." Can we say that these tracks are an utterance of the hare? Certainly not, even if the clock should have just struck five. This means that, if a sentence is to be considered as an utterance,

there must be someone who produced it for the *purpose of communicating* a fact to another person or persons. Not every human statement is an utterance in this sense. If you read " Then the little Hiawatha learned of every bird its language," you do not imagine that Longfellow seriously intended to communicate to you that Hiawatha learned the birds' languages. Thus Longfellow's verse is not an utterance. But now it is when you say to a child " You are a little angel " ? Certainly, you wish to communicate to it something ; but not that it is in fact an angel, but rather that you like it. It is advisable to consider such sentences as utterances, because they communicate a fact, though not the fact they literally record.

Thus we may give the following definition.

An *utterance* is any statement produced by a person for the purpose of communicating to someone a fact expressible by a statement.

A *strict meaningful language* is a meaningful language whose statements are utterances.

This pragmatical and semantical definition conforms better than any other we have given in this paper to what may be called natural language.

Prague.

MORE ABOUT SOME OLD LOGICAL PUZZLES

By A. M. MacIver

WE are often told that such traditional antinomies as the *Mentiens* and the Epimenides can be avoided by some sort of Theory of Types. In these antinomies we are apparently presented with propositions which must either be both true and false at once or else neither, so that they break either the Law of Contradiction or the Law of Excluded Middle. The essence of any Theory of Types, as I understand it, is that the sentences which appear to express these propositions are illegitimate combinations of symbols. I do not wish to deny that Theories of Types are valuable, but I sometimes wonder whether " illegitimate ", in this usage, is not just a *blessed word* like " Mesopotamia ". Is anything more meant by calling these combinations of symbols " illegitimate " than just that they lead to these particular paradoxes ? Is a Theory of Types, in fact, anything more than an instrument of diagnosis, enabling us to distinguish at sight symbolic formulae which are liable to lead to paradox from those which are safe ? A prudent logician, who wishes to keep paradox out of his system, will add to the rules of his symbolic notation one which excludes such formulae from it. But what is the force of this probibition? Is it more than an announcement that statements of the dangerous kind are not going to be made in his book ?

There is one interpretation which would make a Theory of Types something more than just an instrument of classification or rule of " safety first ". This is to take " illegitimate " to mean simply " meaningless ". But this takes us out of the field which logicians can control by laying down rules of their own. Whether or not a form of words (at least in ordinary language) is meaningless is an empirical question, being the question whether as a matter of fact those who use the language do or do not understand anything by it. If it is found that we do in fact understand something by one of these sentences that cause the trouble, that would seem to decide the issue against any Theory of Types (and so apparently against the universality of the Laws of Contradiction and Excluded Middle). The logician is,

however, entitled to point out that there are different senses of " meaning ". Perhaps he may be able to show that, although in a sense we " understand something " by one of these sentences yet it is not in a sense which leads to these inconvenient consequences.

This seems in fact to be the case with the simplest form of the *Mentiens*—" This proposition is false ". This is a pronominal sentence, the proposition which it expresses varying according to the reference of the pronoun " this ". When we speak of "understanding the meaning " of a *non-pronominal* sentence, we mean knowing what proposition it expresses. But we often speak of " understanding the meaning " of a *pronominal* sentence, considered apart from any context, meaning knowing what proposition it *would* express, given any particular suitable context. Now the pronominal sentence " This proposition is false " has a meaning in this sense, for there are possible contexts in which it will express propositions—namely when the reference of the pronoun " this " is to some other proposition, as in " I have heard it said that Mr. Ryle is a Cambridge man, but this proposition is false ". But it does not follow that it expresses a proposition when the reference of the "this" is to the (fictitious) proposition which the sentence itself is supposed to express. That there is in fact no such proposition appears as soon as we try to find a non-pronominal sentence to express it. What is being asserted ? That the proposition p is false. But what is this proposition p ? The proposition that the proposition p is false. But the proposition that *what* is false ? So we may go on for ever and never find what it is that we are supposed to be talking about. But, if the sentence, in this usage, does not express any proposition, then it gives rise to no paradoxes.

But the same does not, at least *prima facie*, seem to be true of some of the more complicated forms of the Epimenides. In its simplest form the Epimenides is not an antinomy at all. It is not even a contradiction. It is just a proposition which cannot be true in the circumstances in which it is supposed to be asserted. If I sign my name to a declaration that I cannot write, that fact by itself is evidence that the declaration is false, because, if it were true, I would not be able to sign my name to it ; but this does not make the declaration self-contradictory. Similarly

the proposition " No Cretan ever tells the truth " is not self-contradictory, but, if it were true, it could not be asserted by any Cretan, and so, if we know that a Cretan has asserted it, we know that it is not true.[1] I am not suggesting that the two examples are absolutely parallel, but they are parallel in this, that neither proposition is self-contradictory but each is proved untrue by the circumstances of its assertion. The difference between them is important, because it is the reason why one, but not the other, *leads to* an antinomy. The strict parallel would be " No Cretan can make an assertion ". If we know that this has been asserted by a Cretan, we know that it must be false. But here we know something to be the case which actually contradicts the proposition. The contradictory of " No Cretan can make an assertion " is " Some Cretans can make assertions ", and this is actually exemplified in the making of *this* assertion by the Cretan Epimenides. But the contradictory of " No Cretan ever tells the truth " is "Some Cretans sometimes tell the truth " and this is *not* exemplified in the assertion of the negative proposition by Epimenides, for what he asserts must (apparently) be *false*. It is very odd that we should know that some Cretans sometimes tell the truth, when the only thing that we know about Cretans may be that this one Cretan has made this one assertion which itself is false. And an antinomy arises if we suppose that there was never any Cretan except Epimenides and he never made any assertion except this. (There is nothing self-contradictory in this supposition.) Would the assertion then be true or false? Apparently it would be false if it were true (for then a true statement would have been made by a Cretan) but it would have to be true if it were to be false (for it can only be false if some Cretan has at some time told the truth, and this is supposed to be the only assertion that any Cretan has ever made).

(Or we may suppose that a succession of Cretans have made false statements, and no Cretan has ever told the truth, and then Epimenides says " No Cretan has told the truth before mid-day to-day ", completing his statement a split second before noon. Again I can see no self-contradiction in the supposition. Would

[1]Nor is the proposition " Epimenides the Cretan asserted that Cretans are always liars " self-contradictory. The question is not whether it can be true that Epimenides made the assertion, but whether what he asserted can be true.

this statement be true or false? In the circumstances, it could not be true unless it were false, or false unless it were true.)

Someone will object at this point that I am neglecting the tacit qualifications to which our use of language is subject—that, when Epimenides said "Cretans are always liars"[2], he meant "Cretans *other than I* are always liars". Perhaps he did (for I am not denying that such tacit qualifications occur). Perhaps if someone had pointed out the paradox to him, he would have said "But of course by *Cretans* I meant *Cretans other than myself*". But surely he might equally well have said "Thank you for the correction—I ought to have inserted a qualification"? That "Cretans" is *not* in fact *always* understood to mean "Cretans other than myself" seems to be shown by the fact that the paradox has troubled people for so long; for, if it was so understood, there would be no paradox. And, if it is said that it *ought* to be so understood, this only brings us back to our starting-point. Is anything more meant by this "ought" than that, if we don't so understand the word, paradox will follow? A logician is not a super-Totalitarian legislator, who can prescribe what other people shall intend by the words which they use.

If a Theory of Types declares that these sentences are *meaningless*, what does it mean by "meaningless"? They are not meaningless in the sense in which we found "This proposition is false" to be meaningless. A form of words has meaning if anyone who knows the language in which it is would understand something from it. From "This proposition is false", if the reference of the pronoun is to the supposed proposition expressed by the sentence itself, nothing can be understood; we cannot say what would have to be the case for the statement to be true. Certainly the same sentence would have a meaning if only the reference of the pronoun were different, but in this there is nothing odd, because it is a pronominal sentence, of which the meaning varies according to circumstances. But "No Cretan ever tells the truth" is not a pronominal sentence.[3] If the telephone rings and the voice at the other end of the line says "I am coming

[2]If he did. But we have Scriptural authority (Titus, 1, 12) that this was said of the Cretans by "one of their own prophets", which is really all that we need.

[3]The other example which I gave does contain the pronoun "to-day", but it is not this that causes the trouble.

to see you to-morrow ", I have to know both who the speaker is and whom he thinks he is addressing before I know what is being asserted, but, if the voice said "No Cretan ever tells the truth", I should not need any knowledge about the speaker in order to understand exactly what was meant. Can it be maintained that, if the sentence " Statements made by Germans are all lies " occurred in an unsigned article in a newspaper, I could not understand what I meant until I had found out the nationality of the journalist who wrote it and whether the statement was true—or that the fact that I found myself able to understand it would be evidence either that the journalist was not a German or that it was false? Yet this would follow, if it were true that, if the writer were a German and all statements made by Germans were lies, then this sentence would *have no meaning*.

(Of course logicians are free to re-define the term " meaning ", for technical purposes, in such a way that all these sentences will be " meaningless " *in this technical sense*—either always or only in the circumstances in which they give rise to paradox, according to the form of definition chosen. Perhaps in some Theories of Types this is what is actually done, without the fact being recognized. But, if so, it is only verbal juggling, because the sentences are not " meaningless " in *any ordinary* sense. It is just another way of expressing the fact that these sentences give rise to these paradoxes.)

What, then, are we going to say? It may be observed, firstly, that the statements which give rise to this particular difficulty are all *general* statements. (This is the difference between the Epimenides and the *Mentiens*.) Secondly, the difficulty only arises if certain circumstances are supposed (e.g. if it is supposed that Epimenides is the only Cretan and that he only makes this one statement). These statements *have meaning*, because there are circumstances in which they would be true and circumstances in which they would be false ; only, it is also possible to describe circumstances in which they would be either both or neither. Is there any real objection to saying (quite simply) that, though the Laws of Contradiction and Excluded Middle apply to all singular propositions, they do not both apply to all general propositions ? We need only reject one of them, and will probably prefer to reject the Law of Excluded Middle,

for it seems to destroy negation to suppose that any proposition can be both true and false at once, but not to suppose that some are neither.[4] It might make reasoning impossible if we could not tell, in the case of a given general proposition, whether the Law of Excluded Middle applied to it or not, but it is here that we seem to find the proper function of a Theory of Types. It is only to a very small class of general propositions that the Law of Excluded Middle does not apply, and, by means of a Theory of Types, the members of this class are recognisable. Moreover we can tell precisely under what circumstances one of these propositions will be neither true nor false. Under any other circumstances they obey the Law of Excluded Middle just as well as any other proposition.

Perhaps logicians might prefer to revise their terminology, altering their technical use of the term " proposition " in such a way that " general propositions " would not be propositions but something else. We might call them simply *generalisations*. This would make no real (as opposed to verbal) difference, but we should then be able to preserve both the Law of Contradiction and the Law of Excluded Middle, in the forms " No proposition is both true and false " and " Every proposition is either true or false." A corresponding law could be stated for generalisations, of the form " Generalisations are either true or false, and not both, except when they are of such-and-such forms, and then except under such-and-such circumstances ".

(These are only tentative suggestions, which I reserve the right to withdraw as soon as I can think of anything better.)

University of Leeds,
April 1939.

[4]Not being a mathematician, I don't know whether this has anything to do with the " denial of the Law of Excluded Middle " by the Finitist School. I suspect not.